FIG. 1 (PRIOR ART)

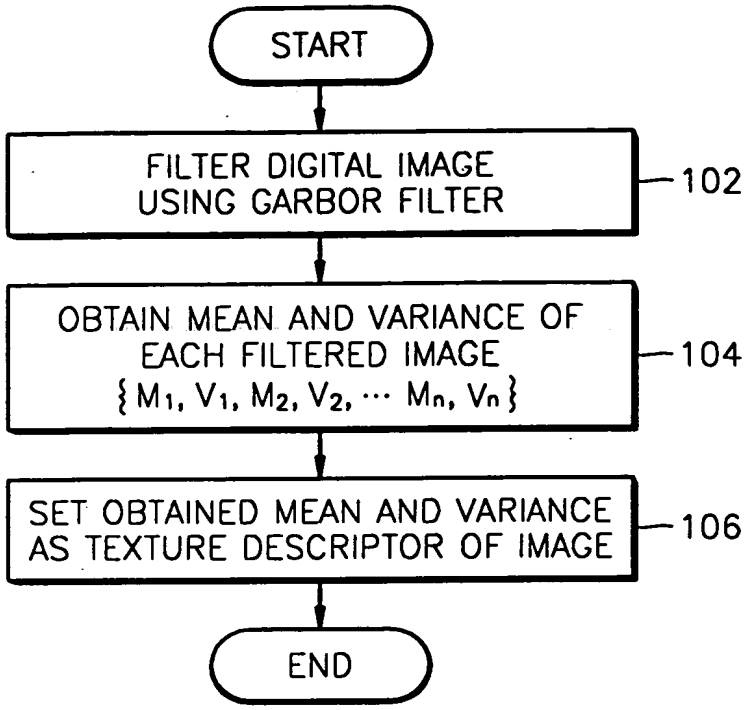



FIG. 2

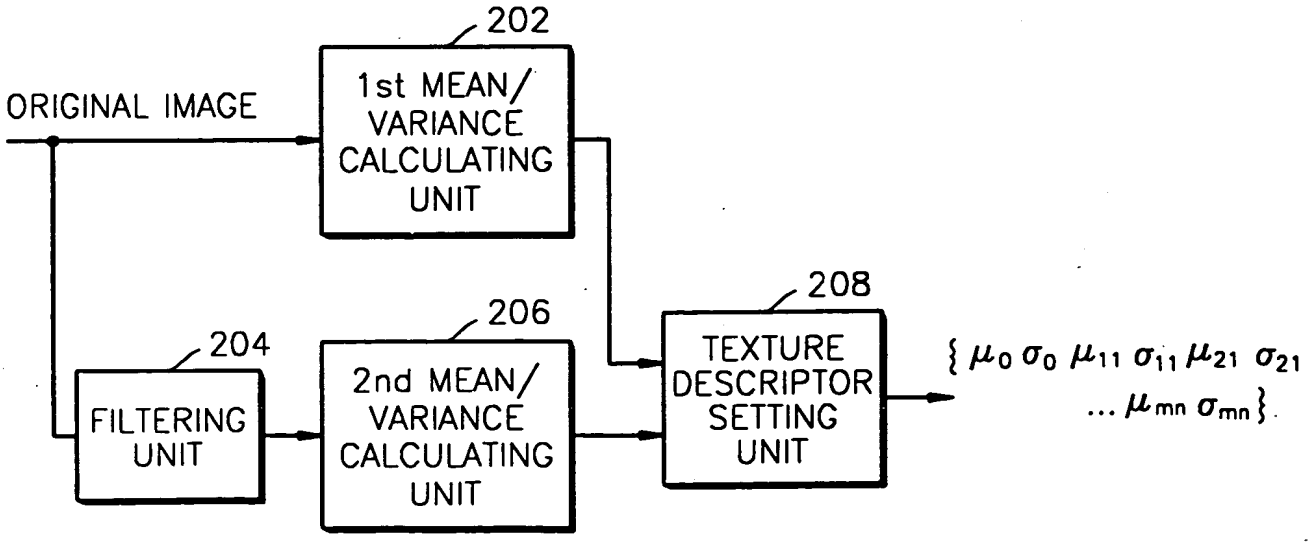


FIG. 3

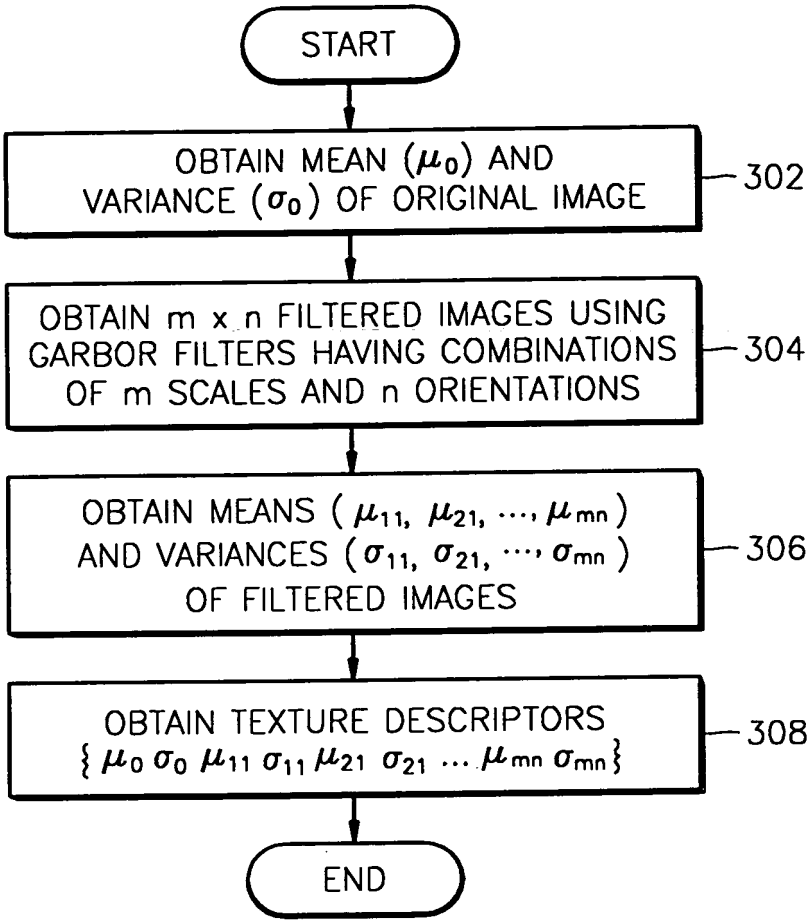

START
OBTAIN MEAN ($\mu_0$) AND VARIANCE ($\sigma_0$) OF ORIGINAL IMAGE
302
OBTAIN m x n FILTERED IMAGES USING GARBOR FILTERS HAVING COMBINATIONS OF m SCALES AND n ORIENTATIONS
304
OBTAIN MEANS ($\mu_{11}, \mu_{21}, \cdots, \mu_{mn}$) AND VARIANCES ($\sigma_{11}, \sigma_{21}, \cdots, \sigma_{mn}$) OF FILTERED IMAGES
306
OBTAIN TEXTURE DESCRIPTORS $\{\mu_0\ \sigma_0\ \mu_{11}\ \sigma_{11}\ \mu_{21}\ \sigma_{21}\ \cdots\ \mu_{mn}\ \sigma_{mn}\}$
308
END

FIG. 4

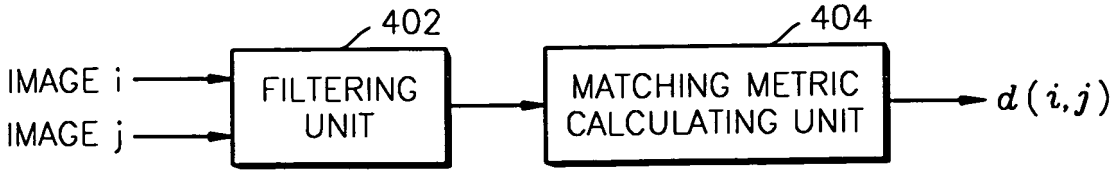
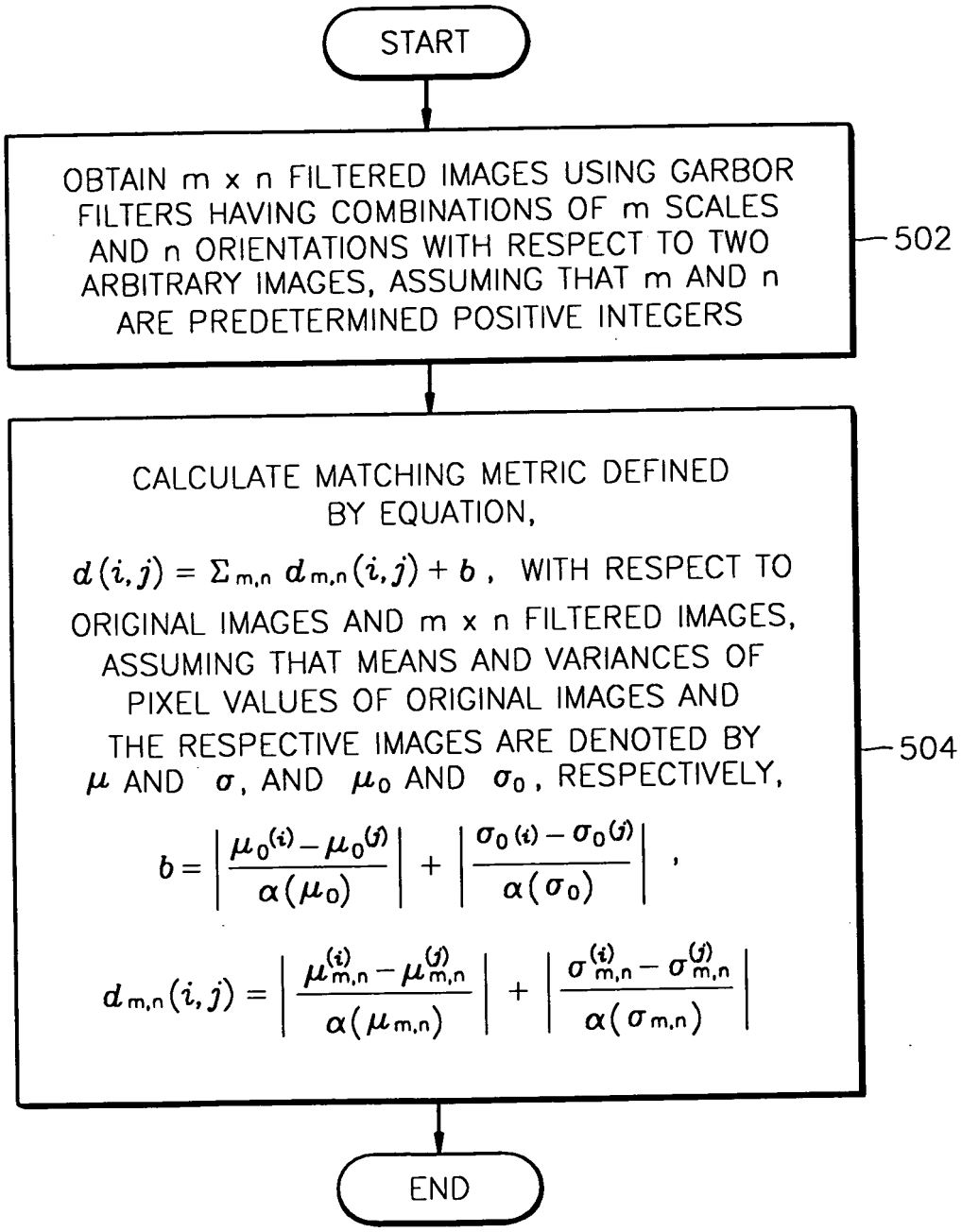
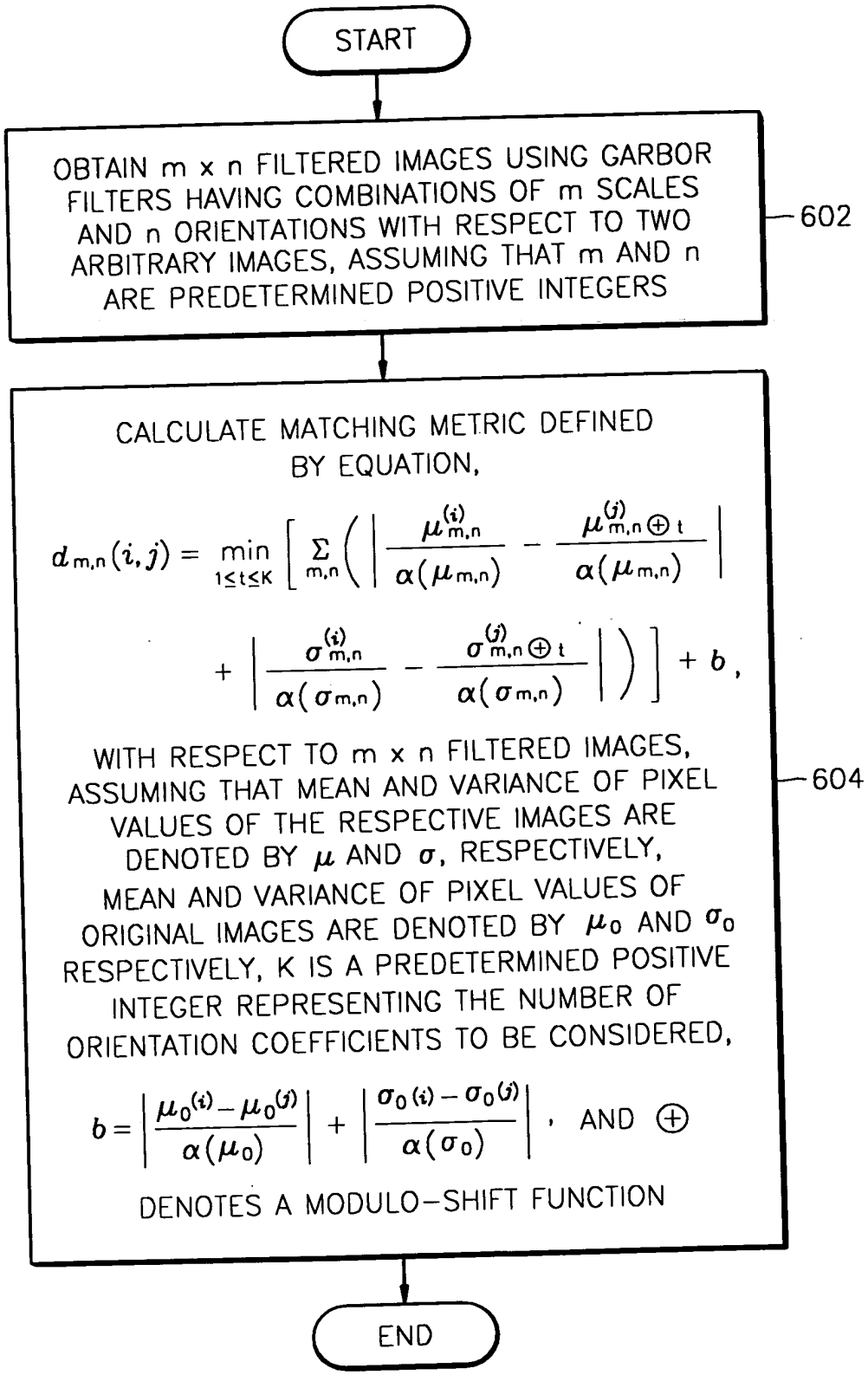


IMAGE i
IMAGE j
402
FILTERING UNIT
404
MATCHING METRIC CALCULATING UNIT
$d(i,j)$

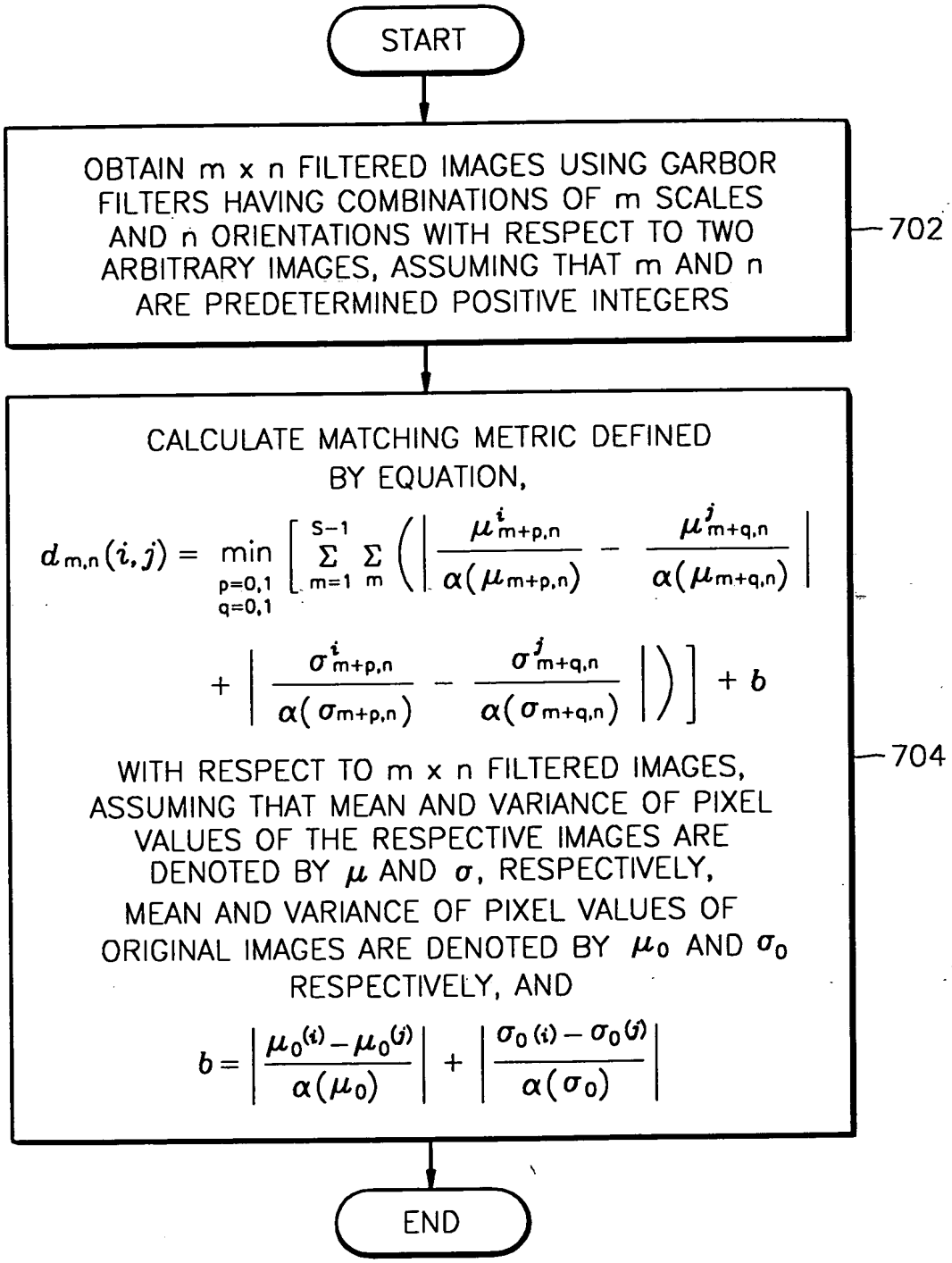
# FIG. 5


START
OBTAIN m x n FILTERED IMAGES USING GARBOR FILTERS HAVING COMBINATIONS OF m SCALES AND n ORIENTATIONS WITH RESPECT TO TWO ARBITRARY IMAGES, ASSUMING THAT m AND n ARE PREDETERMINED POSITIVE INTEGERS
502
CALCULATE MATCHING METRIC DEFINED BY EQUATION,
$d(i,j) = \Sigma_{m,n}\, d_{m,n}(i,j) + b$, WITH RESPECT TO ORIGINAL IMAGES AND m x n FILTERED IMAGES, ASSUMING THAT MEANS AND VARIANCES OF PIXEL VALUES OF ORIGINAL IMAGES AND THE RESPECTIVE IMAGES ARE DENOTED BY $\mu$ AND $\sigma$, AND $\mu_0$ AND $\sigma_0$, RESPECTIVELY,
$b = \left|\frac{\mu_0^{(i)} - \mu_0^{(j)}}{\alpha(\mu_0)}\right| + \left|\frac{\sigma_0^{(i)} - \sigma_0^{(j)}}{\alpha(\sigma_0)}\right|$,
$d_{m,n}(i,j) = \left|\frac{\mu_{m,n}^{(i)} - \mu_{m,n}^{(j)}}{\alpha(\mu_{m,n})}\right| + \left|\frac{\sigma_{m,n}^{(i)} - \sigma_{m,n}^{(j)}}{\alpha(\sigma_{m,n})}\right|$
504
END

# FIG. 6


START
OBTAIN m x n FILTERED IMAGES USING GARBOR FILTERS HAVING COMBINATIONS OF m SCALES AND n ORIENTATIONS WITH RESPECT TO TWO ARBITRARY IMAGES, ASSUMING THAT m AND n ARE PREDETERMINED POSITIVE INTEGERS
602
CALCULATE MATCHING METRIC DEFINED BY EQUATION,
$$d_{m,n}(i,j) = \min_{1\le t\le K}\left[\sum_{m,n}\left(\left|\frac{\mu_{m,n}^{(i)}}{\alpha(\mu_{m,n})} - \frac{\mu_{m,n\oplus t}^{(j)}}{\alpha(\mu_{m,n})}\right| + \left|\frac{\sigma_{m,n}^{(i)}}{\alpha(\sigma_{m,n})} - \frac{\sigma_{m,n\oplus t}^{(j)}}{\alpha(\sigma_{m,n})}\right|\right)\right] + b,$$
WITH RESPECT TO m x n FILTERED IMAGES, ASSUMING THAT MEAN AND VARIANCE OF PIXEL VALUES OF THE RESPECTIVE IMAGES ARE DENOTED BY $\mu$ AND $\sigma$, RESPECTIVELY, MEAN AND VARIANCE OF PIXEL VALUES OF ORIGINAL IMAGES ARE DENOTED BY $\mu_0$ AND $\sigma_0$ RESPECTIVELY, K IS A PREDETERMINED POSITIVE INTEGER REPRESENTING THE NUMBER OF ORIENTATION COEFFICIENTS TO BE CONSIDERED,
$$b = \left|\frac{\mu_0^{(i)} - \mu_0^{(j)}}{\alpha(\mu_0)}\right| + \left|\frac{\sigma_0^{(i)} - \sigma_0^{(j)}}{\alpha(\sigma_0)}\right|$$, AND $\oplus$ DENOTES A MODULO-SHIFT FUNCTION
604
END

# FIG. 7


START
OBTAIN m x n FILTERED IMAGES USING GARBOR FILTERS HAVING COMBINATIONS OF m SCALES AND n ORIENTATIONS WITH RESPECT TO TWO ARBITRARY IMAGES, ASSUMING THAT m AND n ARE PREDETERMINED POSITIVE INTEGERS
702
CALCULATE MATCHING METRIC DEFINED BY EQUATION,
$$d_{m,n}(i,j) = \min_{\substack{p=0,1 \\ q=0,1}} \left[ \sum_{m=1}^{S-1} \sum_{n} \left( \left| \frac{\mu^{i}_{m+p,n}}{\alpha(\mu_{m+p,n})} - \frac{\mu^{j}_{m+q,n}}{\alpha(\mu_{m+q,n})} \right| + \left| \frac{\sigma^{i}_{m+p,n}}{\alpha(\sigma_{m+p,n})} - \frac{\sigma^{j}_{m+q,n}}{\alpha(\sigma_{m+q,n})} \right| \right) \right] + b$$
WITH RESPECT TO m x n FILTERED IMAGES, ASSUMING THAT MEAN AND VARIANCE OF PIXEL VALUES OF THE RESPECTIVE IMAGES ARE DENOTED BY $\mu$ AND $\sigma$, RESPECTIVELY, MEAN AND VARIANCE OF PIXEL VALUES OF ORIGINAL IMAGES ARE DENOTED BY $\mu_0$ AND $\sigma_0$ RESPECTIVELY, AND
$$b = \left| \frac{\mu_0(i) - \mu_0(j)}{\alpha(\mu_0)} \right| + \left| \frac{\sigma_0(i) - \sigma_0(j)}{\alpha(\sigma_0)} \right|$$
704
END